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A REVIEW ON BIOLOGICAL EFFECTS OF Charila (Parmelia perlata) IN COSMECEUTICALS

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ABSTRACT
A lichen, or a close symbiotic interaction between fungi and algae, Parmelia Perlata (Huds.) Ach. is a member of the Parmeliaceae family and is commonly referred to as "Stone Flower" and "Charila" in India. The hilly areas of the Indian subcontinent are often home to it. The lichen has traditionally been used to cure a wide range of conditions, such as boils, inflammations, vomiting, excessive salivation, bronchitis, and toothaches. Numerous unique chemical components were found to be present in it, including atornin, salazinic acid, lecaronic acid, and usnic acid. It has also been associated with nocturnal emission, amenorrhea, leucorrhea, dyspepsia, calculi, conditions of the heart and blood, stomach problems, enlarged spleen, bleeding piles, scabies, leprosy, and overall discomfort. It tones the urinary system and inhibits the formation of calculi. It has long been a part of the traditional cuisine of the Rai and Limbu people of East Nepal. It is also utilized as a bio-indicator of air pollution caused by heavy metals and as a light brown wool dye. It has not yet been fully studied for therapeutic effects and is therefore unexploited in the pharmaceutical sector, despite being demonstrated to have antibacterial, antiurolithiatic, anticancer, and antidiabetic qualities, among others. The most likely causes are difficulties with identification and bulk collecting, as well as the lack of recent scientific papers on lichens. Providing explanations of many updated features, including taxonomy, botanical descriptions, common names, synonyms, traditional applications, chemical compounds, pharmacological activities, etc. is the main objective of the current publication on P. perlata. It is the first scholarly compilation of this kind and can be a useful resource for scholars who wish to learn more about this lichen.
KEYWORDS: *Lichen, Parmelia Perlata, Chharila, Phytochemical Characteristics, And Pharmacological Profile*

INTRODUCTION

In Indian cookery and traditional medicine, the lichen Parmelia perlata, often called stone flower (family Parmeliaceae), is used as a spice. It is often known as "Kalpasi" in Tamil and "Pathar ke phool" in Hindi. P. perlata grows on rocks, bark, and old walls in both temperate and tropical regions. A fungus and an alga collaborate to form lichens, which are symbiotic organisms.It has been used medicinally in Ayurvedic, Siddha, and Unani systems due to its antibacterial, anti-inflammatory, antipyretic, and wound-healing properties.

In addition to its therapeutic usage, it is valued as a condiment due to its aromatic scent, especially when added to spice blends **like** . garam masala.

Pharmacological study indicates that Parmelia perlata contains significant secondary metabolites, including aliphatic acids, depsides, depsidones, and terpenes, which contribute to the plant's medicinal qualities. Because of these bioactive components, it is considered a viable natural source for the development of herbal formulations and nutraceuticals.

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Parmelia perlata (Stone Flower) Botanical Description

Kingdom: Fungi Ascomycota Division
The class is called Lecanoromycetes.
Order Lecanorales; Family Parmeliaceae
Genus: Parmelia
The species is Parmelia perlat.
Morphology: To create the lichen Paramelia perlata, an alga (phycobiont) and a fungus (mycobiont) collaborate.
The thallus is slackly attached to the substrate, which may be old walls, rocks, or bark, and is flat and foliose (leaf-like).
It is grayish-black to dark brown in color and appears papery or brittle when dry .
On the wrinkled surface, there are overlapping lobes that range in width from 2 to 5 mm.
On the dark underside are rhizines, which resemble roots.
It produces unique vegetative reproductive organs known as soredia and isidia.
It has no true roots, stems, or leaves.
Lichen acids, notably depsides and depsidones, are responsible for the plant's aromatic and medicinal properties.

Phytochemical Constituents of Parmelia perlata (Stone Flower)

Studies have shown that a wide variety of secondary metabolites are responsible for the pharmacological effects of Parmelia perlata. The primary phytoconstituents are as follows:
1. Aliphatic acids, such atranorin and lecanoric acid, promote antibacterial and antioxidant properties.
2. Depsides and depsidones, which are known for their cytotoxic, antifungal, and anti-inflammatory properties, include lecanoric acid, norstictic acid, and salaminic acid.
3. Terpenoids, including zeorin and hopane derivatives, have antimicrobial and hepatoprotective qualities.
4. Sterols and fatty acids, including β-sitosterol and palmitic acid Promote wound healing and immunomodulatory actions.
5. Other metabolites include polysaccharides, glycosides, tannins, and trace amounts of phenolic substances.
These phytochemicals are responsible for the antibacterial, antioxidant, wound-healing, hepatoprotective, and anti-inflammatory qualities observed in both modern pharmacology and traditional medicine.

Biological Effects of Parmelia perlata in Cosmeceuticals

Parmelia perlata has a variety of chemicals that may be beneficial in cosmeceutical formulations, including terpenoids, sterols, phenolic compounds, depsides, and depsidones.

Principal Effects

1. Antioxidant activity neutralizes free radicals, slows the aging process of the skin, and protects against UV-induced oxidative stress.
2. The anti-inflammatory effect lessens skin irritation, redness, and inflammation; it is good for acne and sensitive skin.
3. Antimicrobial properties
Effective against Staphylococcus aureus and Candida albicans, it has the potential to be used in natural preservatives, dandruff shampoos, and acne treatments.
4. By encouraging tissue repair and collagen synthesis, regenerative activity and wound healing support scar healing regimes.
5. Effects on skin lightening and depigmentation By blocking the tyrosinase enzyme, several metabolites reduce the production of melanin.
6. The impact of UV shielding, or photoprotection Lichen metabolites act as organic sunscreens by absorbing UV radiation.

Safety Profile of Parmelia perlata (Stone Flower)

1. Hazards from Chemicals

Includes lichen acids, including lecanoric acid, atranorin, salazinic acid, and occasionally usnic acid.
Both human and animal hepatotoxicity has been linked to usnic acid.

2. In vitro and in vivo toxicity

Cell lines have been demonstrated to be cytotoxically affected by methanolic and ethanolic extracts.Pregnant women should exercise cautious after zebrafish embryo tests revealed potential embryotoxicity.

3. Research on Animals

Hepatoprotective properties against CCl_4-induced liver damage were demonstrated using aqueous/methanolic extracts in rats, indicating dose-dependent safety.

4. **Impact on Reproductive Health**

Higher quantities of methanolic extract showed sperm immobility in vitro, suggesting possible implications on male fertility.

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5. Clinical and Human Reports
Very little information on direct clinical safety.
Although traditional usage is seen to be usually safe, excessive or uncontrolled dosages can be dangerous.
There have been reports of liver damage from supplements containing usnic acid, which emphasizes the necessity of quality monitoring.

6. Empirical Safety Guidelines
Oral usage should be closely watched, particularly in youngsters, pregnant or nursing women, and patients with liver problems.
To prevent irritation or allergic reactions, conduct a patch test prior to topical usage.
Steer clear of high or prolonged dosages, especially if usnic acid is present.

Market Potential of Parmelia perlata (Stone Flower)
1. Current Market Demand and Use.
Often used as a spice in Hyderabadi, Maharashtrian, and South Indian (Chettinad) cooking. Offered in spice blends such as goda masala and biryani masala.
→ **For instance,** "stone flower / dagad phool / kalpasi" is sold online by packaged spice businesses like Boom Spices and Bliss Earth**.**
Medicinal/Herbal Uses: Promoted for conventional health advantages such antibacterial, anti-inflammatory, and digestive support. It is available in formulations and as a dried whole spice from a number of herbal sources**.**

Export Market: To underline its desire for exports, suppliers such as Arizone International list weekly supply capacity (about 5000 kg/week).

2. Pricing and Positioning in the Market
In wholesale commerce, the price per kilogram is around ₹480.
Strong retail margins are demonstrated by the retail packaged prices of ₹200–₹300 for 50–100 g packs (≈₹2000–₹6000/kg equivalent).
Premium Branding: Western Ghats stone flowers that are organic or wild-harvested are sold for high prices.

3. Advantages and Special Features (USPs)
A rare, specialized spice with a rich culinary history in the area.
Dual market in the medical and culinary industries.
High value in the premium and organic packaging markets.

4. Difficulties and Hazards.
Sustainability: The availability of natural lichens may be threatened by overharvesting.
Quality Control: Reliability may be lowered by adulteration or species variability.
Regulation: In export markets, pharmaceutical claims may be questioned.
Lack of recognition outside of regional cuisines is known as the awareness gap.

5. Prospects
Value-Added Products: herbal supplements, extracts, and ready-made masalas.
Demand in gourmet food markets and expatriate groups is driving export growth.
Online Retail: Growing through gourmet spice boxes and e-commerce.
Sustainability Branding: Organic certification and traceability can add value.

6. **Prospects for the Market**
Strong profit margins for branded, packaged stone flowers are demonstrated by the price difference between retail and wholesale.

Due to its specialty in Ayurveda and gourmet cookery, it is appropriate for high-end, export-focused, and wellness-related industries.

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Parmelia perlata (Stone Flower) Formulations

Formulation	Preparation/ Ingredients	Uses /Indications	Dose
Powder (churna)	Whole dried thallus powdered	Skin diseases, itching, diarrhea, seminal weakness	1–3 g with honey/water
Decotion (Kashayam)	Powder boiled in 16 parts water, reduced to 1/4	Diarrhea, cough, fever, burning micturition	30–40 ml
Cold infusion(Hima)	Powder soaked overnight in cold water	Burning sensation, urinary disorders	40-50 ml
Paste (Lepa)	Fresh/dried thallus ground with water	Wounds, skin diseases, swelling, analgesic	External application
Powder+Honey	Powder mixed with honey	Cough, asthma, cold	1-3 g
Powder+Cows urine /Hot water	Hot water Powder taken with vehicle	Urinary calculi, stone, swelling	1-3 g
Herbal OIL (Taila)	Thallus infused in sesame/olive oil	Arthritis, gout, rheumatism, sciatica	External massage
Ethanolic Extract	Ethanol extraction	Anticancer (ovarian cell line),antibacterial, antioxidant	IC50 ~31 µg/ml (cell line

CONCLUSION

Parmelia perlata, often known as stone flower, connects herbal therapy, ancient culinary application, and contemporary business opportunity. Market data shows high profitability in retail trade, and phytochemical tests confirm its bioactivity. Safety issues highlight the significance of sustainable harvesting, standardized treatment, and regulated dosage. Overall, it is a viable natural resource that has room for both international market expansion and additional pharmacological validation.

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